

969.956



# PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: WALTER ARTHUR MELSOM

Date of filing Complete Specification Sept. 27, 1961.

Application Date Sept. 27, 1960.

Complete Specification Published Sept. 16, 1964.

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969.956

No. 33216/60.

Index at acceptance—F2 P(1A8, 1A9, 1A14, 1A15A, 1A19B, 1A28B, 1B7); F2 G(2A, 2D, 2F, 2G)  
 International Classification:—F 06 I

## COMPLETE SPECIFICATION

### A New or Improved Hose-end Fitting and Flexible Hose Equipped Therewith

WE, OIL FEED ENGINEERING COMPANY LIMITED, a British Company organised under the laws of Great Britain, of Vincent House, Vincent Square, London, S.W.1, hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of assembling hose-end fittings and to flexible hoses and hose-end fittings for use with such a method.

At the present time it is usual, especially in the case of hose of large diameter, to apply an end fitting to the end of the hose by forming the fitting with a relatively long rigid metal insert which is built-in to the end of the hose in the course of its manufacture: the use of such a rigid insert results in imposing a large bending strain at the connection and so in imposing limitations in installations: as the insert generally constitutes an inner liner to the hose, the metal of the insert is subjected to considerable wear when the matter being conveyed through the hose is of an abrasive nature or to attack when the matter is of acidic nature.

It is the main object of this invention to provide a method of producing a hose-end with a built-in fitting which will avoid the defects referred to.

According to the present invention a method of assembling a hose end fitting to a flexible hose includes attaching a hose end fitting element to a length of flexible metal tube and then building the metal tube into the flexible hose.

Preferably the metal tube is embedded in the hose material so that it does not form a liner to the bore of the hose. Thus, the flexible hose may include rubberised

material which is cured after the hose end fitting has been assembled to it, and the hose may be built up from layers of rubber and reinforcing material, the metal tube being disposed between the layers.

A coiled wire may be included in the hose, the wire being arranged to surround the metal tube and cause it to be distorted, and a layer of rubber or reinforcement may be arranged between the wire and the metal tube.

The method may also include arranging for the innermost layer of rubber to be extended and bent-up over the end face of the hose end fitting to provide a sealing ring thereon, and this bent-up portion may be provided at its extremity with an enlargement.

Thus the method may include forming the end fitting element with a circumferential groove and fitting the outer portion of the end of the hose into it.

The invention also includes a hose end fitting for assembly to a hose by the method set forth and which comprises a hose end fitting component to which is attached a length of flexible metal tube.

Preferably the length of the flexible metal tube is not less than 2.5 times the nominal bore diameter of the hose with which it is to be assembled.

The component may conveniently include inner and outer ring parts having cooperating projections and recesses between which the metal tube is locked.

The end fitting may include an outer retaining member which is dimensioned so that it can pass over the end fitting component and locating means which can be inserted between the retaining member and the component to connect them to transmit axial thrust, and the retaining member is

[Price 4s. 6d.]

preferably in the form of a clamping ring which can be passed endwise over the component and having an internal recess in which the locating means in the form of a retaining ring can be accommodated, the retaining ring cooperating with an abutment surface formed on the component to transmit axial thrust thereto from the clamping ring.

In any case the flexible metal tube may be made from braided metal wire.

The invention also includes a hose with a hose end fitting which has been assembled to it by the method as set forth.

The invention is illustrated in the drawings accompanying the provisional specification in which Figure 1 is at the upper half a longitudinal section and at the lower half an elevation of a hose end prepared in accordance with this invention and Figure 2 is a longitudinal elevation of a length of braided metal tubing with an attached end fitting part prior to its incorporation in the hose.

Referring to the drawings a hose end element fitting comprising inner and outer rings *a*, *b*, formed with buttress-shaped projections, is assembled on the end of a braided metal tube *c* so that the rings become mechanically interlocked with the tube *c*.

The hose in the particular case shown is built up by an inner lining *g*, of rubber, of plies *f*<sub>4</sub>, *f*<sub>5</sub> and *f*<sub>6</sub> of reinforcing fabric material, and plies *e*<sub>1</sub>, *e*<sub>2</sub> and *e*<sub>3</sub> of rubber having embedded in it a coiled reinforcement wire *d* about the ply *e*<sub>1</sub> are arranged further plies *f*<sub>1</sub>, *f*<sub>2</sub> and *f*<sub>3</sub> of fabric material, the hose having about it a covering *h* of rubber.

For the purpose of the invention, the braided metal tube *c* is sandwiched between the plies *e*<sub>2</sub> and *e*<sub>3</sub> and the end of the covering *h* is arranged in a circumferential groove *a*<sub>2</sub> in the ring *a* thus, when the hose is cured the tube *c* and the rings *a*, *b* attached thereto become substantially an integral part of the hose itself.

The ring components *a* and *b* form part of an end fitting element which is completed by a coupling flange ring *m* mounted on the part *a*: this ring *m* is fitted after the hose, with the inserted tube *c*, has been cured: for this reason the ring *m* is formed with a bore opening dimensioned to pass endwise over the ring *a*: this ring *m* has an internal groove *m*<sub>1</sub> which, by moving the ring *m* to the right to carry the groove past the flange *a*, receives a spring coil *x*, the ring *m* then being moved to the left to cause the spring to pass onto the reduced diameter neck of the ring *a*: the spring *x* now trapped between the ring *m* and the ring *a* acts as an axial thrust member between those parts when the flange *m* is drawn, by bolts passed through openings in both parts, against a complementary end fitting *F*.

The inner ring *b* is formed, as shown, with an outwardly extending flange *J* having an annular groove *j*<sup>1</sup>: the lining of the hose *g* is extended and formed with an enlargement *k* which functions as an O ring seating in part of the groove *j*<sup>1</sup> in the flange *j* and in a corresponding groove *k*<sup>1</sup> formed in the complementary end fitting *F*.

#### WHAT WE CLAIM IS:—

1. A method of assembling a hose end fitting to a flexible hose which includes attaching a hose end fitting element to a length of flexible metal tube and then building the metal tube into the flexible hose.

2. A method as claimed in claim 1 which includes embedding the metal tube in the hose material so that it does not form a liner to the bore of the hose.

3. A method as claimed in claim 1 or claim 2 in which the flexible hose includes rubberised material which is cured after the hose end fitting has been assembled to it.

4. A method as claimed in claims 2 or 3 in which the hose is built up from layers of rubber and reinforcing material, the metal tube being disposed between the layers.

5. A method as claimed in claim 4 in which a coiled wire is included in the hose, the wire being arranged to surround the metal tube and cause it to be distorted.

6. A method as claimed in claim 5 in which a layer of rubber or reinforcement is arranged between the wire and the metal tube.

7. A method as claimed in claims 4, 5, or 6 in which the inner most layer of rubber is extended and bent-up over the end face of the hose end fitting to provide a sealing ring thereon.

8. A method as claimed in claim 7 in which the hose end fitting is provided with a recess in its end face in which the end of the bent-up portion is accommodated.

9. A method as claimed in claim 7 or claim 8 in which the bent-up portion is provided at its extremity with an enlargement.

10. A method as claimed in any one of the preceding claims which includes forming the end fitting element with a circumferential groove and fitting the outer portion of the end of the hose into it.

11. A method of assembling a hose end fitting substantially as described with reference to and as shown in the accompanying drawings.

12. A hose end fitting adapted for assembly to a hose by the method claimed in any one of the preceding claims comprising a hose end fitting component to which is attached a length of flexible metal tube.

13. A hose end fitting as claimed in claim 12 in which the length of the flexible metal tube is not less than 2.5 times the nominal bore diameter of the hose with which it is to be assembled.

14. A hose end fitting as claimed in claim 12 or claim 13 in which the component includes inner and outer ring parts having cooperating projections and recesses between which the metal tube is locked.
15. A hose end fitting as claimed in claim 12, claim 13 or claim 14 for use with the method claimed in claim 7, claim 8 or claim 9 having a circumferential recess in its end face to accommodate the sealing ring.
16. A hose end fitting as claimed in any one of claims 12—15 including an outer retaining member which is dimensioned so that it can pass over the end fitting component and locating means which can be inserted between the retaining member and the component to connect them to transmit axial thrust.
17. A hose end fitting as claimed in claim 16 in which the retaining member is in the form of a clamping ring which can be passed endwise over the component and having an internal recess in which the locating means in the form of a retaining ring can be accommodated, the retaining ring cooperating with an abutment surface formed on the component to transmit axial thrust thereto from the clamping ring.
18. A hose end fitting as claimed in claim 17 in which the retaining ring is a spring coil.
19. A hose end fitting as claimed in any one of claims 12—18 in which the flexible metal tube is made from braided metal wire.
20. A hose end fitting substantially as described and as shown in the accompanying drawings.
21. A hose provided with a hose end fitting which has been assembled by the method claimed in any one of claims 1—11.
22. A hose provided with a hose end fitting as claimed in any one of claims 12—19.
23. A hose connected to a hose end fitting by the method claimed in claims 7, 8 or 9 and the innermost layer of which is extended so that it can be bent-up over the end face of the hose end fitting with which it is to be used to provide a sealing ring thereon.
24. A hose according to claim 23 and substantially as described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.

R. F. COWLING & CO.,  
Chartered Patent Agents,  
Bank Chambers, 329, High Holborn,  
London, W.C.1.

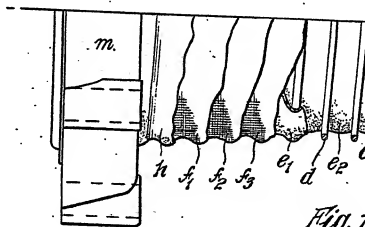
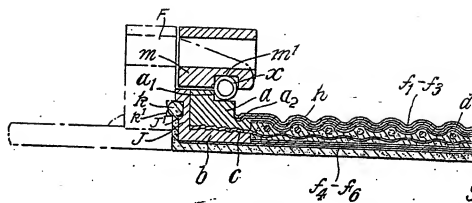


Fig. 1

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COMPLETE SPECIFICATION

1 SHEET

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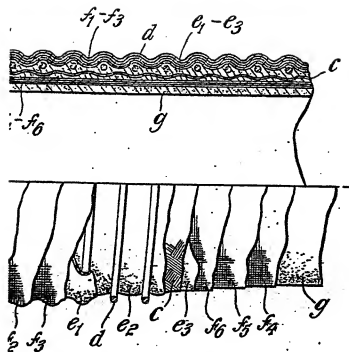


Fig. 1

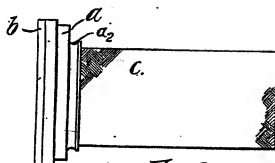


Fig. 2

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